

CLAIMS

The following is claimed:

3 disposing the first target biomolecule onto the first conductive
4 substrate;

5 contacting the first target nanoparticle with the first target biomolecule;
6 and

7 forming a first target complex on the first conductive substrate,
8 wherein the first target complex includes the first target biomolecule and the
9 first target nanoparticle.

1 7. The method of claim 1, wherein forming a first detector complex comprises:

2 contacting the first conductive substrate to a foreign conductive
3 structure to cause the reduction of the first detector nanoparticles onto the first
4 target nanoparticle.

1 8. The method of claim 1, wherein a first marker molecule is attached to the first
2 target biomolecule.

1 9. The method of claim 1, wherein a first marker molecule is attached to the first
2 target nanoparticle.

1 10. A method for determining the presence of biomolecules using a surface-
2 enhanced Raman spectroscopy (SERS) system, comprising:

3 providing a first target biomolecule;

4 providing a first target nanoparticle;

5 forming a first target complex that includes the first target nanoparticle
6 and the first target biomolecule disposed on a first conductive substrate;

7 providing a solution of first detector nanoparticles;

8 causing the first target complex to contact the solution of first detector
9 nanoparticles;

10 catalyzing the deposition of the first detector nanoparticles on the first
11 target complex;

12 forming a first detector complex that includes the first detector
13 nanoparticle disposed on the first target complex;

14 directing a laser at the first detector complex, wherein the interaction of
15 the laser with first detector complex produces a SERS signal specific for the
16 first target biomolecule; and

17 detecting the SERS signal.

- 1 11. The method of claim 10, wherein catalyzing comprises:
 - 2 applying a voltage to the first conductive support.
- 1 12. The method of claim 11, wherein the voltage is applied using a potentiostat.
- 1 13. The method of claim 10, wherein catalyzing comprises:
 - 2 contacting the first conductive substrate to a foreign conductive
 - 3 structure to cause the reduction of the first detector nanoparticles onto the first
 - 4 target nanostructures.
- 1 14. The method of claim 10, wherein forming a first target complex comprises:
 - 2 forming the first target complex prior to being disposed on the first
 - 3 conductive substrate.
- 1 15. The method of claim 10, wherein forming a first target complex comprises:
 - 2 forming the first target complex by contacting the first target
 - 3 nanoparticle with the first target biomolecule that is disposed on the first
 - 4 conductive substrate.

- 1 16. A biosensor system for determining the presence of biomolecules, comprising:
 - 2 a first target complex disposed on a first conductive substrate, wherein
 - 3 the first target complex includes a first target biomolecule and a first target
 - 4 nanoparticle, and wherein the first target nanoparticle is disposed on the first
 - 5 target biomolecule;
 - 6 a first detector nanoparticle disposed on the first target nanoparticle,
 - 7 wherein the first detector nanoparticle is electrochemically deposited on the
 - 8 first target nanoparticle; and
 - 9 a SERS system capable of detecting a SERS signal specific for the first
 - 10 target biomolecule.
- 1 17. The system of claim 17, wherein the first target nanoparticle includes a gold nanoparticle.
- 1 18. The system of claim 17, wherein the first detector nanoparticle includes a silver nanoparticle.
- 1 19. The system of claim 17, wherein the SERS system includes a laser system.
- 1 20. The system of claim 17, wherein the first target nanoparticle includes a nanoparticle in the size range of about 1 nanometer and about 1000 nanometers.

